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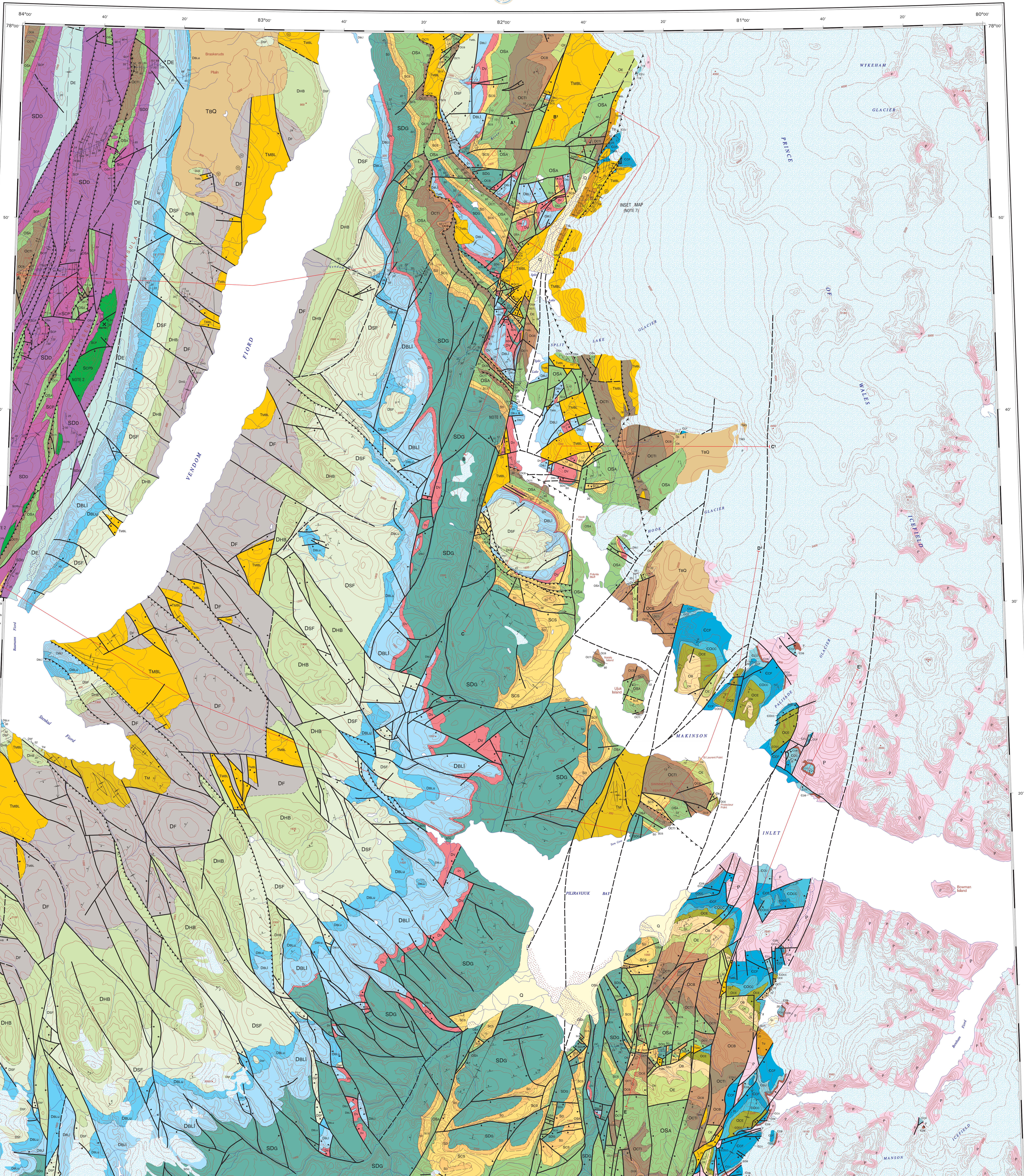

LEGEND

POST-OROGENIC GRAVELS

QUATERNARY
PLEISTOCENE AND HOLOCENE

Q — *Fluvial and glaciofluvial gravels, diamictite, scattered erratics, minor peat (mapped only where the nature of bedrock cannot be inferred).*

NEOGENE AND QUATERNARY
PLIOCENE AND PLEISTOCENE

TBQ — *'BRASKERUDS' beds and glaciofluvial drift, undivided (see also Note 6): Sand, fine- to coarse-grained, quartzose, unconsolidated, cross-stratified; silt; gravel; minor uncoalified wood, leaves, peat, mud;* ***fluvial, swamp and lacustrine deposits;*** *unconformably overlain by unconsolidated or locally cemented glaciofluvial gravels, diamictite and scattered erratics;* ***periglacial****.*

SVERDRUP BASIN SUCCESSION

PALEOGENE
EUREKA SOUND GROUP (TMBL–TM)

TM — *MARGARET FORMATION (Upper Paleocene–Eocene): sandstone, quartzose, fine- to medium-grained; yellowish orange and pale yellowish grey weathering; lignite, locally fused and stained red; siltstone; minor mudrock;* ***deltaic and nonmarine****.*

TSL — *'SPLIT LAKE' beds (TSL; Upper Paleocene–Upper Eocene): conglomerate, pebble to boulder size with granitoid gneiss clasts; arkose; quartz sandstone; minor siltstone, shale, and coal;* Tu*: unnamed carbonate clast conglomerate; minor sandstone;* ***alluvial fan****.*

TMM — *MOUNT MOORE FORMATION (Upper Paleocene): sandstone, quartzose, variably calcite-cemented or uncemented; cross-stratified; pale to moderate yellowish brown, greyish yellow and greyish orange weathering; abundant detrital coal fragments; siltstone; marl; mudrock; minor conglomerate;* ***deltaic and nearshore marine****.*

TMBL — *MOUNT BELL and MOUNT LAWSON FORMATIONS, undivided (Upper Paleocene, possible Maastrichtian at base): mudrock, with intercalated and thin-bedded lithic and volcanogenic sandstone and siltstone; moderate to dark brownish grey weathering; minor lignite coal; abundant silicified wood; basal thin unit of sandstone, quartzose, cross-stratified, white to dark yellowish orange weathering; lignite coal;* ***fluvial and marginal marine*** *(See also Note 5).*

FRANKLINIAN SUCCESSION

DEVONIAN
OKSE BAY GROUP (DSF–DHG)
UPPER DEVONIAN

DHG — *HELL GATE FORMATION (Frasnian). Sandstone, minor siltstone, and coal. Sandstone: yellow to orange weathering; fine- and medium-grained; medium- and thick-bedded, trough and planar cross-stratified, scattered pebbles, shale-chip conglomerate. Siltstone: green and red weathering; thin-bedded, recessive;* ***braided fluvial****.*

DF — *FRAM FORMATION (Frasnian). Sandstone and siltstone. Sandstone: locally calcareous; dusky red and white weathering; fine-grained; thick- to thin-bedded, abundant trough cross-stratification; common fining- and coarsening-upward sequences. Siltstone: calcareous dusky red and green weathering; thin-bedded;* ***meandering fluvial****.*

MIDDLE DEVONIAN

DHB — *HECLA BAY FORMATION (Givetian). Sandstone: rare chert pebbles; pale yellowish orange and yellowish grey weathering; fine- to medium-grained; thick-bedded; planar and trough cross-stratified;* ***braided fluvial****.*

LOWER AND MIDDLE DEVONIAN

DSF — *STRATHCONA FIORD FORMATION (Emsian and Eifelian). Sandstone, siltstone, mudrock, minor conglomerate, and limestone. Sandstone: quartzose, micaceous and calcareous; dusky red and yellowish green weathering; thin- to thick-bedded, abundant cross-stratification. Siltstone and mudrock: micaceous; dusky red weathering; thin-bedded, planar-parallel and cross-stratification, mudcracks. Conglomerate: yellowish grey; pebble and granule grade; thick-bedded. Limestone: light brown weathering, thin-bedded; abundant crinoids;* ***meandering, braided fluvial, marine****.*

LOWER DEVONIAN
BLUE FIORD FORMATION (Emsian) (See also Note 4)

DBLu — *Members 2 and 3 (undivided):*
Member 3. Dolostone and limestone: yellow and yellowish brown weathering; thick-bedded, fenestral; vuggy porosity locally; fossiliferous to unfossiliferous; ***open shelf****.*
Member 2. Dolostone, limestone, siltstone, minor gypsum and anhydrite. Limestone and dolostone: silty; dusky red and yellowish green-weathering; thin-bedded; recessive. Siltstone: dusky red and pale yellowish green weathering; thin-bedded; planar, parallel lamination, ripple marks. Gypsum and anhydrite: white and red weathering; nodular and laminated; ***restricted marine, paralic, floodplain****.*

DBLl — *Member 1. Limestone, minor dolostone and sandstone. Limestone and dolostone: yellowish grey weathering; medium- to thick-bedded, bioturbated; abundant fossils; locally fenestral, biostromal, and biohermal. Sandstone: calcareous; pale yellowish brown and dusky yellow weathering; thin-bedded, massive;* ***open shelf****.*

DV — *VENDOM FIORD FORMATION (Emsian): Dolostone, conglomerate, gypsum, rare sandstone and siltstone. Dolostone: variably arenaceous; dusky red, yellowish green, and yellowish brown weathering; thin- to thick-bedded; rare skeletal fragments; moldic porosity. Sandstone: dusky red and pale yellowish brown weathering; locally cross-stratified. Siltstone: gypsiferous locally; moderate red and yellow-grey weathering; thin-bedded, recessive. Conglomerate: yellowish grey weathering, granule to cobble, rarely boulder, size; thick-bedded. Gypsum: white, orange and red weathering; planar-parallel lamination and nodular;* ***restricted shallow marine sediments, locally hypersaline; alluvial fan deposits*** *(see also Notes 3 and 7).*

SILURIAN AND DEVONIAN
UPPER SILURIAN AND LOWER DEVONIAN

SDG — *GOOSE FIORD FORMATION (Ludlow to Pragian). Dolostone, limestone, minor sandstone. Dolostone: light grey, yellowish grey, and pale yellowish brown weathering; thin- to thick-bedded, resistant; locally very fossiliferous. Limestone: yellowish grey and pale yellowish brown weathering; thick- to medium-bedded; abundant brachiopods, corals, and stromatoporoids; numerous chert nodules, silicified trilobites and atrypids in basal part of formation; locally common stromatoporoid-coral bioherms and biostromes. Sandstone: yellowish grey weathering; fine-grained; thick- to medium-bedded; cross-stratified and massive;* ***restricted and open marine****.*

SILURIAN
UPPER SILURIAN

SD — *DOURO FORMATION (Ludlow). Limestone: locally argillaceous and dolomitic; yellowish grey, pale yellowish brown, and pale yellowish green weathering; thick- and medium-bedded, locally burrow-mottled; abundant atrypid brachiopods and corals; rare coral-sponge bioherms;* ***open marine****.*

SCS — *CAPE STORM FORMATION (Ludlow). Dolostone: minor silt; light grey and yellowish grey weathering; medium-bedded; planar-parallel lamination, abundant silicified mudcracks;* ***restricted marine****.*

ORDOVICIAN AND SILURIAN
UPPER ORDOVICIAN TO UPPER SILURIAN

OSA — *ALLEN BAY FORMATION (Katian to Ludlow?)*
Upper part. Limestone: dolomitic; yellowish grey; very thick-bedded; bioturbation structures; domal and laminar stromatolites, rare brachiopods; ***restricted and open marine****.*
Middle part. Dolostone: locally abundant silicification; yellowish grey and pale yellowish brown weathering; thick-bedded; abundant vuggy and biomoldic porosity; bitumen stained locally; abundant pentamerid brachiopods, stromatoporoids, corals, and crinoids; rare stromatoporoid-coral biostromes; ***open marine****.*
Lower part. Limestone: dolomitic; light grey and yellowish grey weathering; thick-bedded, burrow-mottled; sparsely fossiliferous; ***open marine****.*

ORDOVICIAN
CORNWALLIS GROUP (OCB–OCTI)
UPPER ORDOVICIAN

OCTI — *THUMB MOUNTAIN and IRENE BAY FORMATIONS (undivided)*
IRENE BAY FORMATION (Katian): Limestone and minor mudrock. Limestone: argillaceous; pale greenish yellow and yellowish grey weathering; medium-bedded; rubbly weathering; abundant trilobite fragments, receptaculitids, corals, brachiopods, bryozoans, crinoids, and cephalopods. Mudrock: calcareous; pale greenish yellow weathering; thin-bedded; limestone nodules; ***open marine****.*
THUMB MOUNTAIN FORMATION (Sandbian to Katian): Limestone: dolomitic; light grey and yellowish grey weathering; thick-bedded; burrow mottled; rare crinoid ossicles, corals, gastropods (Maclurites)*, and cephalopods; white chert nodules in upper part;* ***open marine****.*

LOWER TO UPPER ORDOVICIAN

OCB — *BAY FIORD FORMATION (Floian to Sandbian)*
Upper part. Dolostone: greyish green and yellowish grey weathering; thin-bedded; abundant planar-parallel lamination; rare mudcracks; ***restricted marine****.*
Middle part. Limestone and minor dolostone. Dolostone: as in upper part. Limestone: dolomitic; pale yellowish brown; thick-bedded; burrow mottled and locally fenestral; petroliferous, sparse fossils, including fragmentary and disarticulated trilobites, gastropods, crinoids, and brachiopods; ***open marine****.*
Lower part. Limestone, dolostone, mudrock, locally abundant gypsum and/or breccia at the base. Dolostone and limestone: light grey, pale yellowish green, and yellowish grey weathering; thin- to medium-bedded; abundant planar-parallel lamination. Mudrock: calcareous and locally gypsiferous; light grey weathering; fissile; friable. Gypsum: white weathering; planar-parallel laminated; intensely tectonized. Breccia: particulate rubble packbreccia; poorly sorted; angular dolostone and limestone lithoclasts; ***restricted marine****.*

LOWER ORDOVICIAN

OE — *ELEANOR RIVER FORMATION (Tremadoc and Floian): Limestone and dolostone. Limestone: dolomitic; pale yellowish brown and light grey weathering; thick-bedded; massive and burrow mottled; abundant chert nodules and silicified mottles. Dolostone: light grey weathering; thin- to medium-bedded; planar-parallel lamination and mudcracks;* ***restricted and open marine****.*

OB — *BAUMANN FIORD FORMATION (Tremadoc)*
Upper part. Limestone and gypsum. Gypsum: as in lower part. Limestone: yellowish grey weathering; thin-bedded; recessive; ***restricted marine****.*
Middle part. Limestone: dolomitic; yellowish grey weathering; thick-bedded; burrow mottled; resistant; ***open marine****.*
Lower part. Gypsum: white and light grey weathering; planar-parallel lamination; intensely tectonized; recessive; ***restricted marine****.*

OCE — *CHRISTIAN ELV FORMATION (Tremadoc): Limestone, minor dolostone and sandstone. Limestone and dolostone: medium grey and dark grey weathering; medium- to thick-bedded; numerous intraclast beds; rare algal-microbial mounds. Sandstone: calcareous; white and light grey weathering; medium- to thick-bedded; medium-grained; cross-stratified;* ***open and restricted marine****.*

CAMBRIAN AND ORDOVICIAN
UPPER CAMBRIAN AND LOWER ORDOVICIAN

ЄOCC — *CAPE CLAY FORMATION (Trempealeauan to Tremadoc): Limestone and dolostone: yellowish brown and brownish orange weathering in the east, dark grey and dark yellowish brown in the west; thick-bedded; burrow mottled and abundant stromatolite-microbial boundstone; vuggy porosity;* ***open marine*** *(map unit is included with CASS FJORD FORMATION on all structure sections).*

CAMBRIAN
MIDDLE AND UPPER CAMBRIAN
CASS FJORD FORMATION

ЄCFu — *Upper part. Limestone, minor dolostone, mudrock and sandstone. Limestone and dolostone: yellowish grey and greyish yellow-green weathering; thin- to thick-bedded; abundant algal-microbial mounds and intraclast beds; abundant fossils including fragmentary trilobites and brachiopods. Sandstone: quartzose and calcareous; white and yellowish grey; medium-bedded; locally with carbonate intraclasts and ooids. Mudrock: greyish yellow-green weathering; thin-bedded;* ***open and restricted marine****.*

ЄCFl — *Lower part. Limestone, dolostone, sandstone, siltstone, minor mudrock. Limestone and dolostone: variably silty and sandy; pale yellowish orange and red weathering; thick-bedded; abundant intraclast beds, cross-stratification, and planar-parallel lamination; rare fossils including fragmentary trilobites and brachiopods. Mudrock and siltstone: red weathering; thin-bedded; recessive; planar-parallel lamination, mudcracks;* ***restricted marine****.*
Thickness variations of parts of this formation illustrated on the accompanying structural cross-sections are based on measured sections west of the map area and on northeastern Ellesmere Island.

LOWER AND MIDDLE CAMBRIAN

ЄCU — *CAPE LEIPER, CAPE INGERSOLL, POLICE POST, CAPE KENT AND CAPE WOOD FORMATIONS (undivided): Dolostone and limestone: variably argillaceous, arenaceous, peloidal, and oolitic; pale yellowish orange, greyish yellow, and yellowish brown weathering; medium- to thick-bedded; rare burrow mottles; locally abundant trilobite fragments; vuggy porosity with local bitumen stain;* ***open and restricted marine****.*

LOWER CAMBRIAN

ЄDB — *DALLAS BUGT FORMATION: Sandstone: quartzose, locally arkosic and argillaceous, dolomitic in the upper part; yellowish grey and greenish grey weathering; thin- to thick-bedded; abundant horizontal and vertical* (Skolithos) *traces;* ***marine****.*

INGLEFIELD MOBILE BELT

PALEOPROTEROZOIC (~1980 to 1750 Ma; Dawes, 2004)

P — *Gneiss, diverse meta-igneous and metasedimentary rocks, and granitoid rocks, chiefly of granulite grade; intrusive granitoid rock (undivided; see GSC Memoir 409 by T. Frisch, 1988 for details). This unit may include unconformable sedimentary successions of Mesoproterozoic and Neoproterozoic ages where it is overlain by the Ellesmere Group in the subsurface (as illustrated on structural cross-sections).*

Geological boundary (defined, approximate, assumed)

Thin unit, marker (on stratigraphic relationships diagram and structural cross-sections)

Bedding, top known (overturned, inclined, vertical, horizontal)

Bedding (from aerial photographs)

Fault, thrust (synonymous with contraction fault; teeth indicate inferred dip direction of fault and upthrust side; defined and approximate, assumed)

NOTES

1. A semicircular exposure of the Bay Fiord Formation straddles a major fault at a point located 700 m west of the head of Makinson Inlet. This exposure is probably a gravitational slide block transported in recent times from bedrock exposures of the same formation that outcrop uphill and in the same area to the west.

2. Shallow-marine carbonate buildups west of Vendom Fiord are included and mapped within the Cape Phillips Formation. These buildups are Early and Late Silurian (late Llandovery to Ludlow) in age and are correlatives of the upper Allen Bay, Cape Storm, and Douro formations. Most buildups appear to have been deposited in an off-shelf setting surrounded by deep-water graptolitic rocks. However, this interpretation is questionable in cases where the strata resting between the buildups and the Silurian carbonate platform sequence to the east are not exposed.

3. The Vendom Fiord Formation is a distinctive red-weathering unit comprising a wide variety of marine and nonmarine lithofacies. The unit is prominently exposed throughout the belt of faulted rocks situated east and southeast of Vendom Fiord. It has also been documented in the adjacent map areas both to the north and south. However, the Vendom Fiord Formation has not been recognized in its usual stratigraphic position between the Goose Fiord and Blue Fiord formations along the southern boundary of this map area. Its absence in this area may be due to facies change or removal by erosion beneath a sub-Blue Fiord disconformity.

4. The contact between the upper and lower members of the Blue Fiord Formation is marked by a recessive middle member consisting of tentaculitid-rich, thin-bedded limestone. In several areas around the head of Makinson Inlet, these medial beds of the Blue Fiord Formation are represented by a distinctive, red-weathering, siliciclastic, partly nonmarine facies. In many other areas along the eastern side of the map area, a disconformity at the base of the overlying Strathcona Fiord Formation cuts out the upper and medial members of the Blue Fiord Formation.

5. Outliers of the Eureka Sound Group, scattered throughout the map area, are dominated by dark coloured mudrocks, sandstone, and siltstone of the Mount Lawson Formation. The underlying Mount Bell Formation is a thin, possibly discontinuous, unit of white to yellowish orange sandstone that is currently recognized in several areas, including exposures north of Split Lake. Although the Mount Bell Formation may prove to be extensive and mappable on its own, there has been no attempt to delineate the full extent of this unit or the depositional relationship of these beds to the overlying Mount Lawson Formation.

6. Unconsolidated sand and gravel assignable to the Pliocene 'Braskeruds' beds are believed to underlie large areas of the Braskeruds Plain, part of which extends from the Strathcona Fiord map area (2141A) onto this map area west of the head of Vendom Fiord. Other exposures are found and suspected on high-level gravel benches found north and east of Makinson Inlet. Occurrences of uncoalified wood and peat are diagnostic features of these deposits. In most areas, Pliocene beds are disconformably overlain by Quaternary gravels. There has been no attempt to map out the true combined extent of either, except where mapping of Paleogene and older bedrock is precluded by the excessive thickness and lateral continuity of the younger deposits.

7. The inset map, (see Figure 3) of an area north of the head of Makinson Inlet, illustrates locally unique geological features relating to the tectonic and depositional history of southeastern Ellesmere Island in the Early Devonian and, especially, in the Paleogene. A regional angular unconformity, exposed along the west side of the inset area, places Lower Devonian Vendom Fiord Formation on various Lower and Upper Silurian units. This unconformity can be traced throughout the eastern half of the map area with the unconformity surface generally cutting downsection through progressively older strata in an easterly direction. Rapid local changes in thickness of some units, most notably expressed by the Goose Fiord Formation below the Vendom Fiord Formation, indicates that some major faults were likely active in the Early Devonian prior to Vendom Fiord deposition.
   Key features of the inset map are geological relationships associated with the 'Split Lake' beds, a new informally named formation, here included in the Eureka Sound Group. These are coarse clastic sediments of late Paleocene and Eocene(?) age that lie with profound angular unconformity on various older Upper Paleocene Eureka Sound Group strata, and on Cambrian strata in the north. There are westerly transported thrusts and folds in all of these Paleogene strata and the angular unconformity surface itself has been folded. Exposures are especially noteworthy near the middle of the inset map. Compressive deformation structures do not affect Quaternary and Holocene sediments. Flat-lying Pliocene erosional remnants ('Braskeruds' beds) are tectonically elevated but otherwise undeformed.
   Three facies belts of the 'Split Lake' beds can be mapped, with clast size ranging from boulder grade in the north to pebble and sand grade with coal in the south. Clast composition indicates local derivation from the granulite gneisses of southeastern Ellesmere Island. However, the facies belts suggest a north-to-south transport direction for Split Lake sediments during late Paleocene and Eocene time. Energetic Paleogene rivers draining highlands in the north and east is an interpretation that appears to mimic the currently active Holocene fluvial system: a fault-bounded valley with local alluvial fans feeding into a steep gradient, south-flowing, braid channel-braid bar complex.

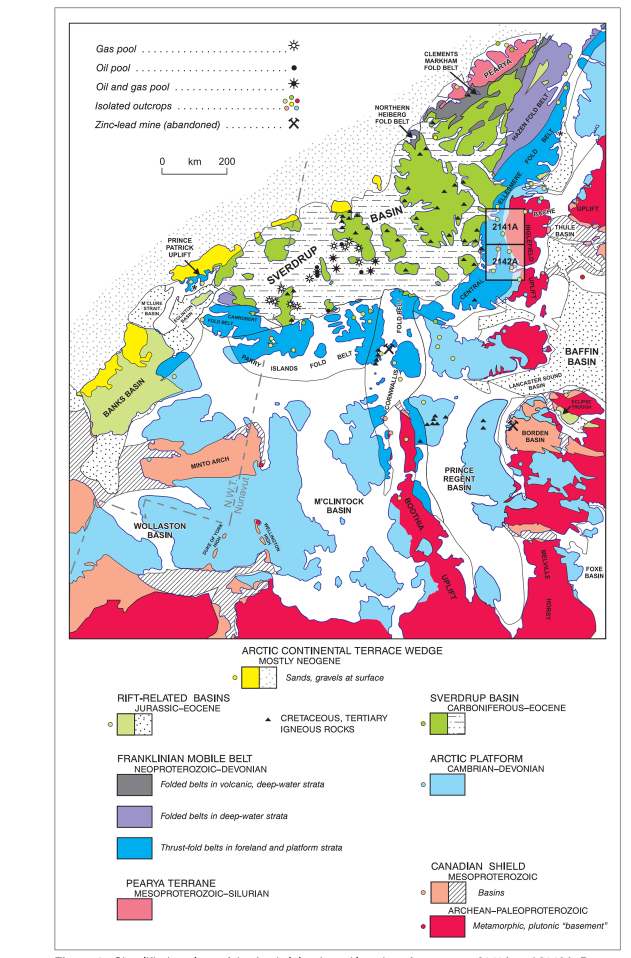

Figure 1. Simplified geology of the Arctic Islands and location of map areas 2141A and 2142A. Pattern fills are reserved for some offshore units.

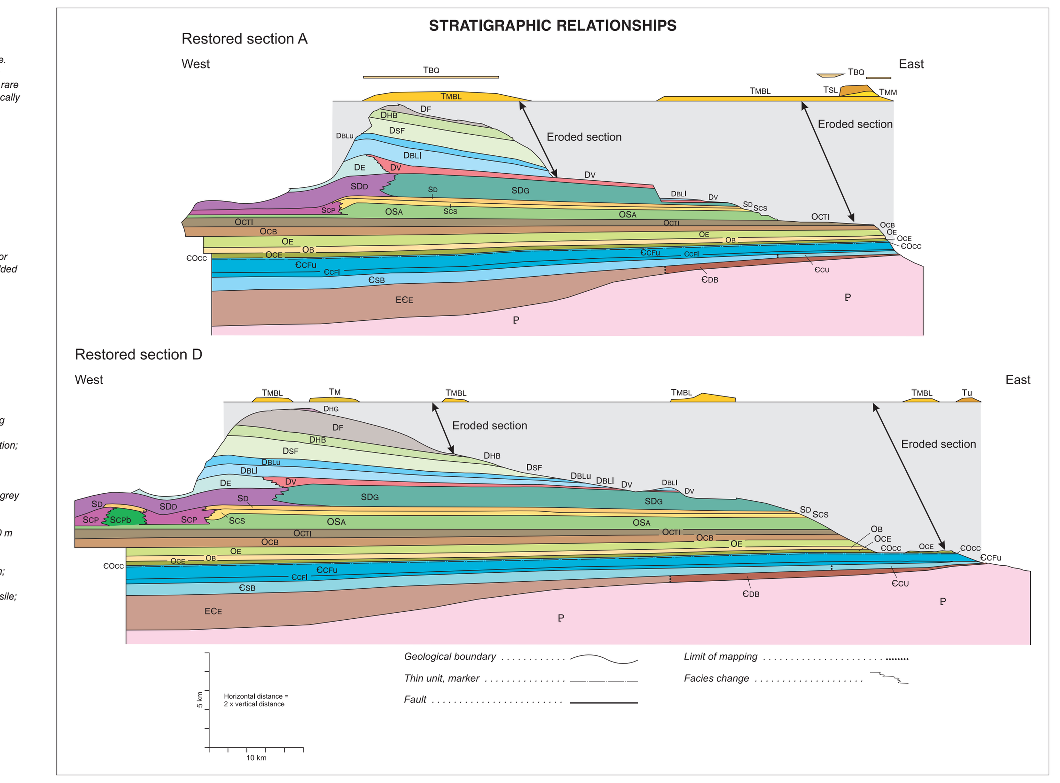

Figure 2. Stratigraphic relationships illustrated along and near lines of cross-sections A and D.

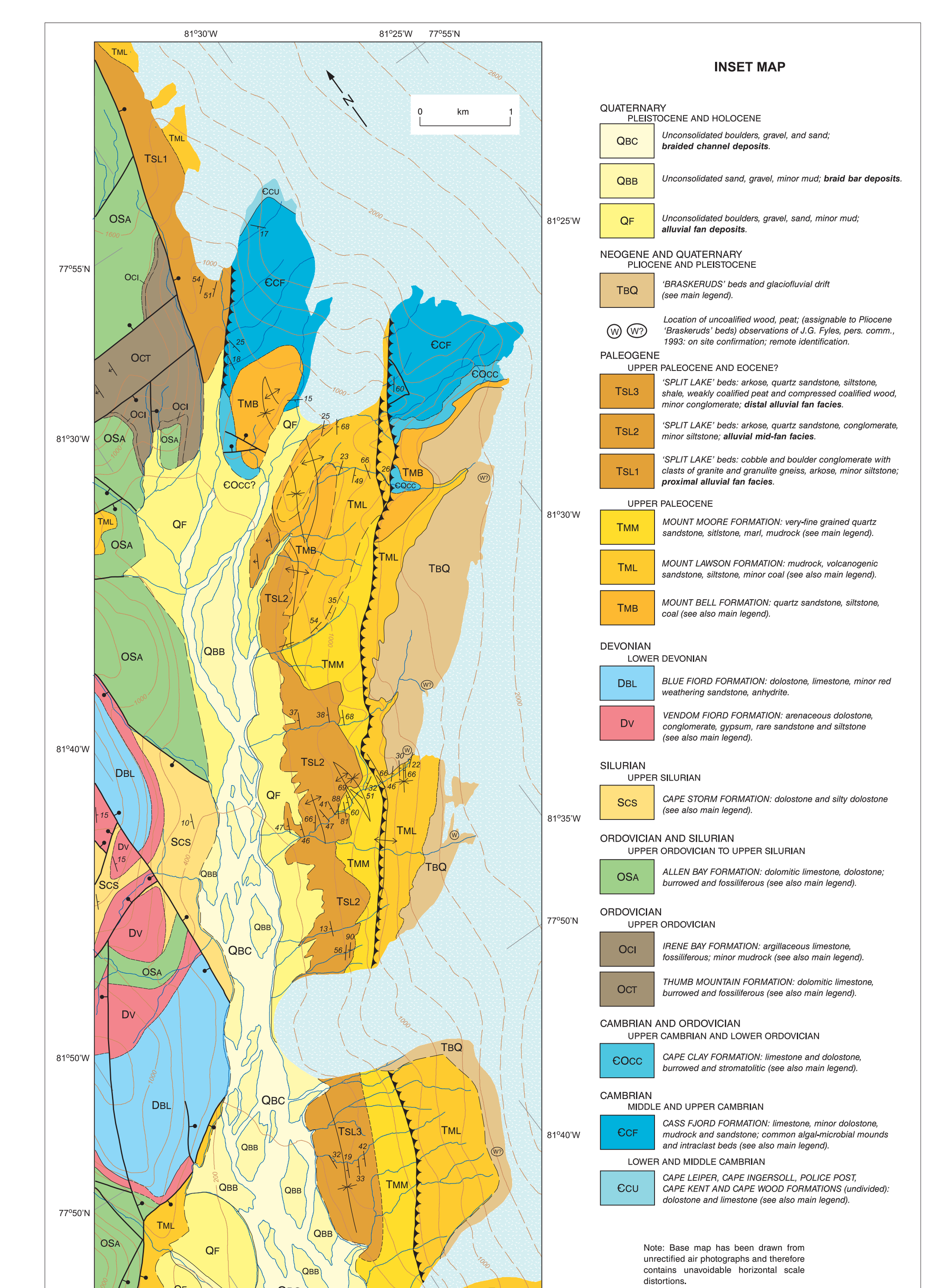

Figure 3. Detailed geology along the west side of Prince of Wales Icefield north of Split Lake (see also Note 7).

Copies of this map may be obtained from the Geological Survey of Canada:
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625 Robson Street, Vancouver, British Columbia V6B 5J3
490, rue de la Couronne, Québec, Quebec G1K 9A9
1 Challenger Drive, P.O. Box 1006, Dartmouth, Nova Scotia B2Y 4A2

LOCATION MAP

Authors: R. Thorsteinsson, J.C. Harrison, and T.A. de Freitas

Geology by R. Thorsteinsson, J.C. Harrison, and T.A. de Freitas, 1993–2005

Geological compilation by J.C. Harrison, 2006

Digital cartography by M.J. Coulthart, Data Dissemination Division (DDD)

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MAP 2142A

PHANEROZOIC BEDROCK GEOLOGY

VENDOM FIORD AREA

ELLESMERE ISLAND

NUNAVUT

Scale 1:125 000/Échelle 1/125 000

kilometres 2 0 2 4 6 8 10 kilomètres

Universal Transverse Mercator Projection
North American Datum 1927

Projection transverse universelle de Mercator
Système de référence géodésique nord-américain, 1927

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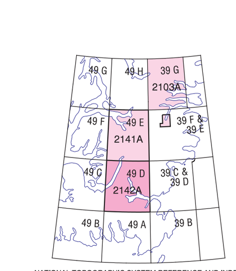
Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Digital base map from data compiled by Geomatics Canada, modified by DDD

Proximity to the North Magnetic Pole causes the magnetic compass to be unreliable in this area

Elevations in feet above mean sea level



Canada

Cross-sections accompany this map

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